THE INVENTORS CLAIM:

1. An automated computer controlled monitoring system for determining the concentration of an analyte of interest in ground water, comprising:

a sampling device within a well casing and comprising valve means and water level sensor means to provide a ground water sample of predetermined volume,

a treatment assembly to receive the sample from the sampling device, said treatment assembly comprising means to provide a calibration standard for the analytical assembly, and one of (a) a treatment cartridge to filter the sample and a calibration sensor, (b) a source of analyte-free water connected with the treatment assembly,

a calibration assembly to add a standard of predetermined concentration of the analyte and volume to the water from the treatment assembly,

an analytical assembly comprising instrumentation for analysis of analytes of interest,

sensor means in the analytical assembly for sensing concentration of the analyte in the sample, and

means to receive analysis and assay data from the analytical module to transmit the data to a cognizant agency.

2.   An automated monitoring system according to Claim 1,

2   and further comprising a calibration loop for establishing a

predetermined amount of standard solution.

3.   An automated monitoring system according to Claim 1,

2   and further comprising:

means to provide a matrix modifier, and

4   a valved loop defining a volume of matrix modifier

introduced into the sample chamber.

4.   An automated system according to Claim 1, wherein the

2   sampling assembly is disposed in a sampling module,

the treatment assembly is disposed in a treatment module

4   with a sample treatment cartridge and a calibration sensor, and

the analytical assembly is disposed in an analytical

6   module.

5.   An automated monitoring system according to Claim 1,

2   wherein:

the analytical and calibration assemblies are disposed in a

4   casing separate from the monitoring well casing to provide improved

environmental control, ease of maintenance and security.

6.   An automated monitoring system according to Claim 1,

2   and further comprising means for stirring the ground water sample

to enhance volatilization of concentration of the analyte in the

4   sample.

7.   An automatic monitoring system according to Claim 1,

2   wherein trichloroethylene is the analyte of interest, and

monitoring and analysis are performed utilizing an optrode

4   assembly and procedure.

8. An automated computer-controlled method for determining

2 concentration of an analyte of interest in ground water, the method

comprising the steps of:

4 collecting and transporting a ground water sample from a

well casing to a preparatory treatment assembly,

6 performing one of (a) passing said water sample through

filtering media in a treatment assembly to remove the analyte of

8 interest, (b) supplying water having no analyte therein from an

external source,

10 passing water from an external source to a calibration

assembly for addition of a calibration standard,

12 passing the water sample with the calibration standard

therein to the analytical module for analysis,

14 analyzing one of (a) the sample, (b) the standard, by

instrumentation appropriate for the analyte of interest, and

16 recording analysis results,

transporting fluids from said analytical assembly to

18 disposal means, and

relaying analysis data from the analytical assembly to a

20 communication system for transmission to a cognizant agency.

28

9.   A method according to Claim 8, and further comprising:

2   introducing calibration standards into a standard container
and transporting the standard by a sample vessel.

10.   A method according to Claim 8, and further comprising

4   the step of:

calibrating said instrumentation for analysis by providing
a predetermined amount of standard solution via a calibration loop
and passing it into the sample chamber.

11.   A method according to Claim 10, and further

2   comprising:

passing the sample from a well casing to a calibration

4   system to prepare blanks or standards for addition of the standard
directly for use in the analytical assembly.

5968

12. A method according to Claim 8, and further comprising
the steps of:

introducing the sample in a sample vessel until a lower
sensor is satisfied, and

adding water to the sample vessel from a water treatment
cartridge until an upper water level sensor in the sample vessel is
satisfied to provide a predetermined dilution.

13. A method according to Claim 8, wherein the analyte of
interest is trichloroethylene and said instrumentation for analysis
comprises an optrode assembly.